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ABSTRACT

The paper reviews studies (1966-1985) of the intellectual abilities of culturally diverse 4-5 year olds in a discussion of the identification of giftedness in culturally diverse populations. Studies are cited which involved Mexican American, Black, Native American, French Canadian, and Belgian students. The following six topics are addressed: (1) identification procedures; (2) reliability and validity of SOI (Structure of Intellect) assessment instruments; (3) efficacy of SOI training; (4) measurement of growth in abilities after training; (5) measurement of growth in achievement after SOI training; and (6) construct validity (carryover of SOI training to improved performance in school subject matters). Figures depict two ways of showing giftedness, and the author emphasizes the value of reorganizing tested abilities and clustering them according to the SOI model. (CL)

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A Partial Compendium of SOI Patterns on Sub-Groups of Gifted People

Mary Meeker, Ed.D.

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A PARTIAL COMPENDIUM OF SOI PATTERNS ON SUB-GROUPS OF GIFTED PEOPLE*

Mary Meeker, Ed.D.

Introduction

When children enter school their minds are neither *Tabulas Rosa* nor fully developed. Four to five years of experience will have afforded them many opportunities to develop intellectual abilities. The question to be answered is: What kind? The kinds of abilities they will have developed depend very much upon their home and social environment.

Coming from a home where English (or their native language) is formal, where there is acceptance, where there are toys, where questions are answered and curiosity is satisfied, where there is a lot of interaction socially and verbally, where there is good nutrition and medical care, children will, given normal brain cells, develop verbal (seMantic) and spatial (Figural) intellectual abilities normally and often to a gifted level.

In contrast, children from homes where limited English and seMantic concepts are experienced, where there is minimal child orientation, where toys are 'busy' toys, where questions invite punishment or sarcasm, where curiosity is punished, where nutrition is limited due to ignorance of food values, and where medical care is limited, will, given normal brain cells, not have the stimulation or internal environment necessary for developing the verbal concepts required for scoring well on traditional academic readiness tests. These tests, like mental maturity or IQ tests, are composed of and depend upon, verbal intelligence (approximately 80% to 85% of these tests require standard English vocabulary and seMantic concepts).

In the conscious raising 60's many psychologists suspected that environmental factors might account for presumed deficiencies from test results in culturally diverse, disadvantaged children. But, with the established assumptions behind IQ scores and correlary assumptions about genetic permanence of intelligence, their voices were only sounds in the wind. So when professionals such as Jensen and Schockley *'proved'* the inferiority of non-anglo children, these sociologists and psychologists were offended enough to expedite research into whether such conclusions were artifacts spurious or false. Benjamin Bloom and J. MacV. Hunt espoused the importance of culture as a variable in forming intelligence. From the perspective of the 1980's it is apparent that we are now much more comfortable with the influences of environment on intellectual capacities. Marian Diamond, a renowned neurological scientist remarked recently, "It is said we are what we eat. To paraphrase, we are what we think, and thought processing resulting from enriched environments just may be the intervening variables between developed or undeveloped intellectual abilities."

The problem then was to 'disprove' the bigotry. Obviously different assessment instruments were needed. Until such instruments were forthcoming, and until analyses of the content of tests could be clarified and publicized, then the need for tests based on different concepts could not be met.

The seminal work of Thurstone, Cattel and Guilford offered promise, but with the IQ concept so entrenched, few psychologists realized that tests purporting to measure intelligence were not

*From a NAGC publication (in press) edited by Susanne Reichert, Ph.D.

based on a theory of human intellectual functions. The SOI analysis of the Binet and WISCs, placing the samplings of each test into Guilford's theory had already been published by the Los Angeles County Board of Education, Division of Research and Guidance (Meeker, M. 1962). Beeman Phillips, University of Texas, Psychology Department, who wanted to devote an issue of The Journal of School Psychology to the state of the art on assessment of disadvantaged children, requested an SOI study of various ethnic groups to see whether there might be patterns of differentiating abilities unique to them. In conjunction with the Santa Monica and Los Angeles County Schools, such a study was designed. (Meeker and Meeker, 1973).

Studies of Intellectual Abilities of Culturally Diverse Four to Five Year Olds
Assessing intellectual abilities as early as age four and five requires patience and skill, if not art, even with individual testing; to test *groups* of them in a school situation is even more difficult. Secondly, to acquire scores on the numbers needed in order to gain national norms is extremely problematic because in 1966 except in a few church schools they were rarely captured as a group before the age of four.

Two of the studies in the compendium-to-follow used the Binet-SOI analyses on four-year-olds. These studies were made prior to 1974. (The SOI -LA tests were published in 1974.) Since then there have been several studies on children ages four and five where the SOI Reasoning Readiness Tests was used specifically for gifted screening of four-and-five-year-olds. Over 4,000 culturally diverse children were screened for gifted programs by Dr. Art Pober, Brooklyn, New York. Dr. Rene Bonne, Bronx, New York used the SOI Process and Diagnostic Tests to screen more than 500 low income, culturally diverse, four-and five-year-olds. A major county in Florida also screened 1500 four-year-olds. The state Louisiana for whom the SOI Process-Diagnostic Tests were originally designed, used this test in order to have reasonably 'pure' factorial samplings of abilities for the purpose of curriculum planning. (Ruth Buck MacDonald, Louisiana State Department of Education-Gifted). Thus in each of these cases students who would not make gifted scores on verbally biased tests, could be identified as gifted if they scored above the 96%ile on Figural or Symbolic intelligence.

School Age Gifted, Culturally Diverse
The compendia of studies which follow concern themselves with some of the SOI studies on culturally diverse gifted in which these aspects are covered:

1. Identification procedures
2. Reliability and validity of SOI assessment instruments
3. Efficacy of SOI training
4. Measurement of growth in abilities after training
5. Measurement of growth in achievement after SOI training
6. Construct validity (carry-over of SOI training to improved performance in school subject matters).

In order to read the trigraphs, the simplification of the SI dimensions is shown in Figure 1. Most educators are familiar with Guilford's 3-dimensional cube , but it is easier to read this chart than to read the S I cube.

Operations		Content		Products	
C	Cognition	F	Figural	U	Units
M	Memory	S	Symbolic	C	Classes
E	Evaluation	M	seMantic	R	Relations
N	coNvergent Production			S	Systems
D	Divergent Production			T	Transformations
				I	Implications

Figure 1

MEXICAN AMERICANS

1973. Disadvantaged Mexican Americans aged four to five were found to be gifted in auditory Memory and Figural intelligence when tested on the Binet with the SOI analyses. Spanish psychologists translated the items. Another group, when tested in English was found to be high in Cognition, Evaluation and Figural abilities ($p<.001$). Blacks aged four to five were gifted in Cognition and Figural abilities. Disadvantaged Mexican Americans aged seven to nine whether tested in English or Spanish were gifted in Cognition and Convergent production . Blacks aged seven to nine achieved gifted memory whereas those aged four to five had gifted Memory and Figural abilities (Meeker and Meeker, 1973).

1974. San Diego City Unified Schools under the leadership of David Hermanson explored ways and means of identifying minority gifted children. Their population exceeded the national distribution of minority in 1974 with 40% being of Mexican heritage with Spanish as a first language and 20% being black. Hermanson with Janice Bennett and Patricia Markel surveyed the best possible administrative organization for identifying minority gifted and teaching to their specific needs. Their ultimate goal was to phase gifted minority children into the traditional gifted program. They pioneered resource rooms with learning centers and used the best auditory methods and audio-visual equipment. Their first definitive finding was that the minority groups were auditory learners and thus were at a disadvantage and unable to perform at gifted levels in the then popular enrichment curriculum which was almost wholly visual. The teachers in the SOI lab rooms documented the critical differences in programming for successful achievement. These techniques and protocols are available upon request from Dr. Hermanson. Their pioneering efforts paid off in successful identification and programming with consequential achievements. After three years of documentation without publication the principle investigators then designed an SOI component in a magnet school for gifted minority candidates which Janice Bennett administered. The success of this program, now in its 10th year as of this 1985 writing, has the validation and reliability information behind it which allows the San Diego Board of Education to mandate funds for designing a new building to be called the SOI Magnet School. The students

identified have ranged from kindergarten through high school. It is one of the oldest and most successful on going SOI minority programs in the U.S.

1978. Cunningham, Thompson, Alston (Houston Schools) and Wakefield (Cal State at Stanislaus) looked at 18 fourth graders, 47 fifth grader and 73 sixth graders. Fifty-six were black, 24 Hispanic and 58 other minorities. They had been selected for gifted programs on the basis of achievement test scores. Cross cultural analyses indicated that the SOI subtests of abilities shown in Table 1 can be used successfully to screen various gifted minorities.

Table 1

PREDICTION EQUATIONS BY GROUPS

Group	Perception	% Variance	Equation Weights/SOI Abilities
Sample	1	39%	.211 (CFC) + .237(CSS) + .088(NSS) - .104
(N=60)	2	31%	.018(DMU) + .113(CFU) + .042(CFS) + .455
	3	38%	.118(CMR) + .164(CFC) + .139(ESS) - .798
Blacks	1	41%	.204(NSS) + .106(CMS) + .106(CMU) - .010(NST) +1.198
(N=56)	2	13%	.229(CSR) + 2.403
	3	1[illegible]	.122(CMR) + 1.102
Mexican-American	1	86%	.038(DSR) - .276(EFC) + .204(CMR) + .072(MFU) + .309(CSS) - .095(EFU) + .079(ESC)- 4.872
(N=24)	2	67%	.191(CFU) - .097(MFU) - .486(CSS) - .190(CMS) + .130(NSS) + 10.450
	3	83%	.250(CMR) + .030(DSR) - .257(CFC) + .021(NFU) - .164(EFC) + .188(ESS) -.064(CFS) -.510
"Others"	1	27%	.055(ESC) + .122(CSR) - .049(CFT) + .088(CMS) + 1.020
(N=58)	2	14%	.013(DMU) - .024(DFU) + 3.954
	3	23%	-.025(DFU) + .008(DMU) + .071(CMU) + 3.279

NOTE:All equations predict teacher perception beyond a chance level. The percentage of variance shared equals the multiple correlation squared.

1979. Gifted Mexican Americans over a period of three years, in grades one through six, made significant gains in all 14 dimensions of the Structure of Intellect. The gains were equally distributed between the 35 girls and 35 boys. SOI study time consisted of one hour a week in a pull-out program. (Los Angeles County Dept. of Education,)

1980. The population for this study conducted by Kanter consisted of 562 seventh and tenth grade Hispanic boys and girls. Scores of both groups were significantly lower than the general population in basic reading abilities (classification, visual closure, and visual discrimination) and in advanced reading abilities (vocabulary, verbal analogies and tracking verbal systems). However, seventh graders scored gifted in auditory memory abilities. While the general Hispanic population

scored higher than the general population in Memory; however, their auditory memory was not sufficient to compensate for low visual memory which is more highly correlated with achievement. A follow-up study to add other SOI abilities training was planned and the study led to earlier (second grade) identification (Hal Kanter, United Independent School District, Laredo, Tx.).

1982. In Laredo, Tx., Mexican Americans, grades one through 12, were given SOI training for 30 minutes a week in their regular classes. Matched controls with several experimental designs were given various limited training in dimensions of intelligence. There were no significant differences in gains in those areas where training was withheld. In the experimental group females showed improvement in Convergent Production, Semantics, Relations and Transformations, specifically in NST, CFU, CMU, CMS and CFC subtests. While males in the experimental group had gains in the general dimensions of Cognition and Convergent Production and specifically in the subtests CMU and CFC. Males across the board made less gains than females. Within groups growth was often significant, however. It was concluded that more time and earlier SOI training needed to be accomplished. Since the same teachers did SOI and regular training, teacher contamination is a possibility (Rosemarie Vida, Laredo College, Laredo, Tx.).

1981-85. In an attempt to identify gifted second through fifth grade Mexican-American educationally disadvantaged students in Pueblo, Co., Gonzales and Vice found that where the school as a whole was below the general population in achievement, students trained in SOI arithmetic-related abilities exceeded the population average of stanine 1 at the end of the first year by scoring at the 5th stanine. By the end of the second year many achieved at the gifted level (8th to 9th stanine) and retained their giftedness achievement over a five year period. A comparable study was undertaken in reading abilities with similar results. (Gonzales and Vice)

1984. The population in this study was made up of 35 Mexican-American boys from grades one through six. All had been identified as gifted on at least three SOI dimensions. Analysis of pre-and post test results after SOI training indicated significant improvement in two traditionally low areas for anglo gifted children -- Evaluation and Figural abilities. One area in which Hispanics often score low--Classification--was improved to the gifted level. (School district's name withheld by request.)

BLACKS

1974-76. In the Westminister Project, Shadduck and Mestyanek studied black children who were failing in the third through sixth grades who had IQ's from 90 to 148 (Binet and WISC). None of them was identified as behavior problems. SOI scores indicated below grade level abilities in all categories except auditory memory and NFU. Rarely did they achieve beyond third grade levels of functioning in all but auditory MSS. Their strength in auditory memory suggests that this is their principal mode of learning. The second year, SOI curriculum remediated their weaknesses, demonstrated by improved scores in retesting on the SOI and CAT (Shadduck and Mestyanek, SOI Institute).

1976-1978. A large county elected to try to identify black, disadvantaged gifted kindergarten children. The SOI Process and Diagnostic Test was developed and field tested for administrative procedures, then the county proceeded to select by percentage the students scoring above 90 percent. Of 1500 screened, 200 students were matched with anglo controls. The experimental group received 30 minutes of SOI training three times a week. On post testing they scored higher

on the state mandated achievement test than did the controls. (Designer, statisticians and Dept. of Education request anonymity)

1981. Culler's study included 45 middle class black students in grades one through six. All had been referred by teachers for gifted screening because of high achievement. Results indicated that these students showed a pattern more similar to anglos than to disadvantaged blacks.

1981-82. Two hundred black females were screened by SOI Career testing for non-traditional jobs. Although these women had finished high school, they were considered functionally illiterate. Fifty-five percent showed uncorrected weaknesses in visual closure, a necessary ability for learning to read (CFU), yet among the 200, 8% showed superior to gifted abilities in CMS. A matched control group showed similar patterns of low arithmetic achievement and high CMS, verbal systems. The potential for giftedness in 8% was there (Meeker and Michielies).

1981-85. Del Paso Heights, a low socioeconomic district near Sacramento, Ca., under the leadership of Dr. Kathryn Favors and Dr. Carl Mack, began an effort to dentify gifted black children in schools where the overall performance was in the lowest quartile and no children had been identified as gifted for the California MGM program prior to Dr. Mack's and Dr. Favor's leadership. The first year volunteer fourth grade teachers administered the SOI-LA test and identified Figurally and Symbolically gifted youngsters were identified. Over a three-years-period all teachers volunteered to use SOI for identification procedures. In the meantime, those students identified as possibly nearing gifted levels were given two hours of mainstreamed SOI teaching weekly. The fourth graders were the first to show group advancement to average and superior achievement scores on the CAT. Each year, as more students go on an SOI program, the scores in the district are improving. At least 10% of the students have now been qualified as gifted on standard and non-standard criteria.
Note: There are many black children on SOI in California Gifted Programs, however, districts do not report their results as research which separates them from other gifted students.

NATIVE AMERICANS

1966. This study by Don Fraser compared 62 Alaskan Indian children in Vancouver, B.C. from six to nine years of age, from both urban and rural homes, with anglo children. Results indicate significantly different patterns in intellectual abilities of the Indian children and the anglo children. Anglos were higher in Convergent Production and Semantic abilities; Indians were higher in Figural and lower in Relational thinking and low in Convergent Production. SOI-Binet Responses were used.

1974. A two year study by Evelyn Hahn looked at SOI abilities of 400 Arizona and New Mexico Navajo Indian children from grades three to six who lived on reservations (60 were identified as gifted). SOI-LA Test results indicated these children as a group scored poorly on classification and semantic tests. Such findings indicate that concept formation and classification tasks show the greatest acculturation bias affecting scores other than semantic tests. The students selected were gifted in auditory Memory and Divergent Production. Although there were equal numbers of boys and girls, 80% of the boys showed art talent in DFU whereas only 5% of the girls did.

1981. Paul Julien found in this study of 244 second through eighth grade Navajo students in Arizona public schools that they scored highest in the Memory and Figural abilities and lowest in

Evaluation and Semantic. The older the children were, the lower their scores tended to be on the SOI test. Correlations with observed behavior were highest with Convergent Production and Cognition. Lowest correlations occurred within ages in Divergent Production. These results substantiate 1) Torrance's findings of decreased creativity with age, (but also show decrease in Convergent production with age), and 2) Meeker's Head Start design for LA city schools, (1965) where IQ scores were found to increase with age..

1982. The population for this study by Tom Hengen included 47 Indian children in Regina, Canada in the fourth through sixth grades. They were compared to a control group of 49 anglos. Data showed that the Indian students were generally higher in Figural intelligence than in Symbolic and Semantic intelligence. Use of SOI training and a computer programming class led to significant improvements to the gifted levels in nine of the 14 SOI dimensions. Achievement test scores also improved significantly in reading, arithmetic and spelling when compared with other controls. Previous to this study, no gifted Indian children had been identified in the population.

FRENCH CANADIAN

1981. Dr. Francois Gagne at Montreal University headed a team effort to administer the French SOI-LA test to Canadian children in the fifth and sixth grades. This study compared the percentile levels of French speaking students on the American norms. The articulation of items in CMU, vocabulary, needed to be reorganized to fit the sequencing of French basal readers, particularly for a the sixth grade gifted. There seemed to be a great jump in their vocabulary concepts above the fifth grade. In comparison with American gifted, the French gifted students scored in the gifted range in Memory and low in Evaluation and Divergent thinking like their American counterparts. The range on each subtest showed a distribution skewed to the right.

BELGIUM

1981-85. Gabriel Santana, University of Belgium at Brussels and Nouvain La Neuve, normed the French form of the SOI-LA test on 100 boys and 100 girls in each grade from the first through the sixth grades and on 800 secondary students. The total 2000 subjects were drawn from rural, urban, private and public school with upper middle, middle and lower economic classes being proportioned between Belgian and emigrant students from four regions in Belgium. They were representative of 60 schools. These students were pre and post tested over three years time. The second project 1) established a percentage of gifted students at each age and 2) established possible careers for secondary students as well. The third year was spent conducting SOI exercises and establishing how to include them in such a rigid school curriculum. After the first norming, some words had to be re-articulated in CMU. Again, as in the Canadian French study by Gagne, the verbal items in CMU needed repositioning. Validity studies and reliability correlations are covered in 12 books by Depuydt-Bert, Santana, Deltour, Colon, Houziaux, who are faculty members from the universities involved in the projects. The French version has been edited to incorporate the CMU sequence.

VARIOUS

1982-83. Two hundred fifty Hispanic and black displaced workers, former assembly line workers from the Ford Motor Co. in Milpitas, Ca., were tested by vocational counselors on the WRAT and CAT to ascertain probability of job placement. They were considered functionally illiterate and unskilled for job placement. These men were reliable workers with limited education. Subsets of the SOI-LA Career test were administered: CFS, CFT, CMR, CMS, MSU-auditory, EFU, EFC,

ESC, NST, NSI and MMI. The state of California, United Auto Workers Union and Milpitas personnel participated in pre and post testing for job profiles with a two week period of SOI training for three hours daily. The group as a whole was gifted in CFU and CFS. Substantial gains were made by 62 of the men. Not all of the men would take the training. Of the total number, however, 15 made gifted scores on at least seven of the sub-tests.

1981-1985. In 1981 minority population in the Berryessa-San Jose, Ca. area was 47%. Each year second graders only were tested on the SOI-LA test in preparation for gifted programming. By 1984, 51 Asian and Pacific, 12 Philipino, 9 black, 22 hispanic and 107 anglo mixtures (202) out of 601 gifted students were participating in gifted programs. There are 27 school districts in Santa Clara County with a total of 16,095 students in gifted programs. The SOI identification program in Berryessa has allowed that school district to identify minority gifted students in proportion to their overall minority population. Previously 80% of gifted were anglos. Now 47% of the gifted come from minority groups. Since 22 of the 26 SOI-LA subtest are tests of thinking abilities rather than tests of knowledge as in IQ and achievement tests, this program has adopted SOI curriculum to develop abilities to a gifted level (Jean Wenberg, Alberto Galindo, Rudy Carino, Betty Miller and Elizabeth Lewis).

1984. This study by Burger included 25 fifth and sixth grade students, culturally diverse, who had been identified as gifted with IQ 's of at least 105. Findings indicated that the culturally diverse have stronger Figural abilities than Semantic. There was a larger difference in the number of students identified by SOI than by traditional methods, both with non-minority students (approximately 2:1) and with culturally diverse students (9:1).

1984. Dr. Rene Bonne, Brooklyn schools, has identified multi-racial majority and minority students as gifted using the SOI-LA Process and Diagnostic test for kindergarteners. They have as their goal to identify 10% of their population. They developed their own distribution of averages to meet their district's needs. Dr. Bonne welcomes inquiries as to identification and progress.

1984-85. Dr. Art Pober, Brooklyn Schools, has designed the Eagle Project for gifted, talented and creative students for enrichment in the arts, performing arts and music. In a multi-ethnic area, the objective was to identify pre-kindergarten youngsters so that they could have a strong preparatory SOI program beginning in kindergarten. Of 4,000 students tested on the SOI Reasoning Readiness Test, they were able to identify 20% for further screening. Children were tested three or less at a time since many of them did not have pencil and paper skills. The strongest predictors for maturity and readiness for learning were CMS, MSU, EFU, NST and NFU.

1985. Project Focus, Omaha Public Schools under the leadership of Margaret Zuke and Judy Hennig, is designed to identify culturally diverse gifted minorities for: academics, creativity, leadership, motivation and self concept. The SOI Creativity Checklist was adapted and simplified to identify the creative students. One hundred thirty-eight primary and secondary students were identified out of 1,245 using various instruments. Previous to 1981 only anglo students had been qualified on IQ and achievement tests alone. The students were qualified with gifted levels on Memory, Figural and Symbolic abilities.

Summary
The uniqueness of giftedness is best depicted pictorially. Figures 1 and 2 present two ways of showing giftedness.

Figure 1 shows the scores of one hispanic student. Note that he would not be considered for a gifted program if one looks at the cluster of verbal abilities (CMU, vocabulary; CMR, verbal relations; CMS, verbal systems; NST, speed of word recognition) which correlate highest with IQ and achievement tests.

Figure 1

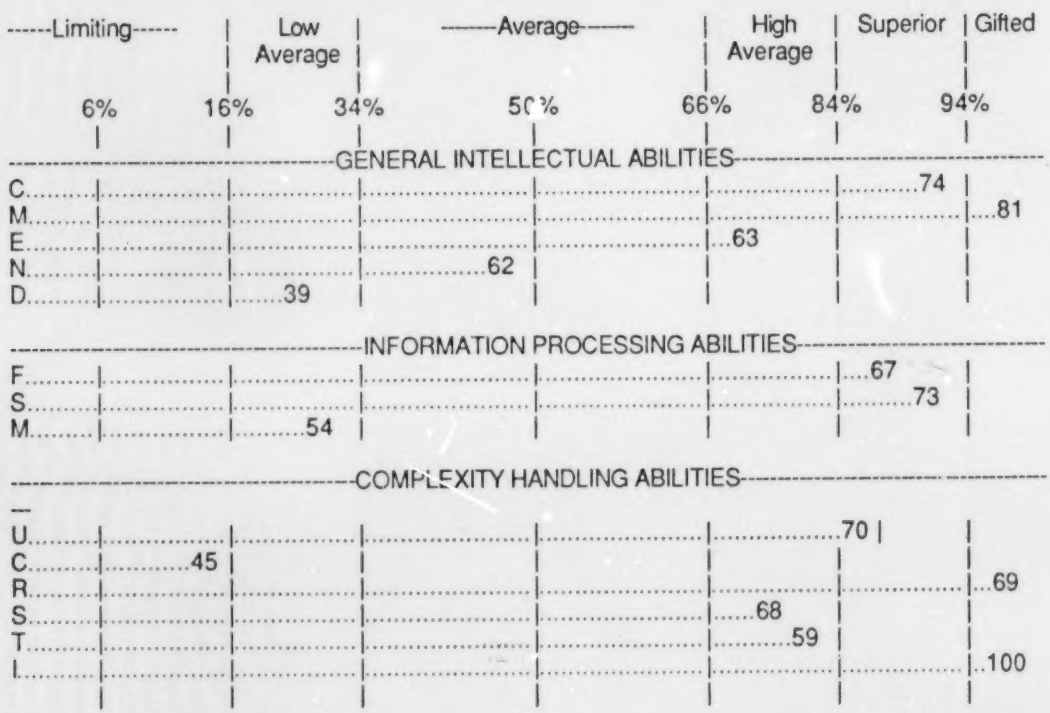
	Limiting		Low Average		Average		High Average		Superior		Gifted
	6%		16%	34%		50%	66%		84%		94%
CFU										13	
CFC				4							
CFS							24				
CFT											19
CSR											7
CSS										7	
CMU									19		
CMR							20				
CMS		11									
MFU							15				
MSUv										18	
MSSv									12		
MSUa										18	
MSUa										12	
MSI											18
EFU											22
EFC					8						
ESC			12								
ESS							6				
NFU					22						
NSS					3						
NSI										21	
DFU							33				
DMU	26										
DSR							75				

(The scores above are raw scores obtained. The vertical lines are percentiles indicated as norms.)

Look at NFU, NSS, and NST--the school achievement factors. They would not suggest his giftedness. However, NSI, logic and form reasoning, indicates he can, given vocabulary, reason at a gifted level. The average number of gifted and superior abilities necessary for qualifying for a gifted program at grade 6 is 12. Juan thus qualifies.

Figure 2 shows Juan's tested abilities (26) reorganized and clustered into the original SI model. We can clearly say Juan is gifted in the Comprehension, Memory, Figural, Symbolic, Relational and Implications dimensions of intelligence.

Figure 2



(The scores above are averaged percent correct for each of the general abilities in the Structure of Intellect. The vertical lines are percentiles indicated as norms.)
(See Fig. 1, SOI diagram for reference.)

He is (and was) imminently ready for gifted programming which would address his strengths as well as his weaknesses. Juan is the first person in his family ever to be graduated from high school, an accomplishment his family takes pride in. He is now considering architecture as a possible major.

Juan's success story is repeated frequently where SOI programs have met individual needs to prepare students for successful achievement and/or to motivate them to complete their education.

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